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ABSTRACT

Studies presented indicate that there is a lack of consistent evidence on the effect of class size on academic achievement. Previous research designs have not adequately accounted for all of the possible influential variables. Future research designs must be more rigorous in their consideration of methods of instruction, student age, class size, academic achievement, and the definition of "large" and "small" classes. (CJ)

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RESEARCH ON THE EFFECT OF CLASS SIZE ON ACADEMIC ACHIEVEMENT

by

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The relationship between class size and academic achievement has been a controversial issue. It appears that for every study which shows a significant relationship between the academic achievement of students and class size there is another study which refutes or contradicts these results. For all practical purposes, class size, as used in this paper, is defined as the number of students which meet with a teacher for a specific period of time for instructional purposes.

Morgan (1978) studied the relationship between class size on the grade point average of students in the Business Curriculum at Piedmont Technical College over a two year period. The courses under study were conducted by full-time staff and were of the same level of difficulty. Large class size was defined as classes with over 30 students while small classes had 30 students or less. He found no significant difference in grade point average of students in large classes than those in small classes. Eash and Bennett (1964) compared the achievement of students on objective tests covering the contents of a general psychology course. They compared large classes of 189, 208 and 167 students with small classes of 31, 36 and 46 students. The subjects were college freshmen in a lecture course. The authors found that the students in the large classes did significantly better than the students in the small class setting. The large lecture classes also had a follow-up with small group discussion. It did not seem that both groups recieved the same treatment in this study.

Laughlin (1976) reviewed the research data on class size. He concluded that class size has not been a major factor in student learning. He goes further by saying that there is little research that can be found that shows that within a skills area, such as applied music, a

one-to-one relationship produces any better student outcome than in larger groups.

Similar results continue to appear in studies on the secondary level. De Angelis (1977) compared two homogeneously grouped sections of ninth grade science students in classes of 46 and 23 pupils each. After six months of instruction there was no significant difference in terms of overall student achievement.

At the elementary level inconsistent results readily appear when comparing the achievement of students in large classes with the achievement of students in small classes. In a study conducted in Flint, Michigan (Lundberg, 1947) the past academic records of the Martin school were compared with the effects of smaller classes and better school facilities of other schools in the district. With a pupil-teacher ratio from 37 and 30 to one, gains were made in reading and math achievement. Flinker (1972) gave the Metro-Achievement Test in Reading and Mathematics to 123 students before and after being placed in either a large class of 55 students or one of two small classes of 34 pupils each. The conclusion was that large class organization favors the development of skills and concepts in language arts and math. It was also found that there was no significant difference between reading achievement of the large group and that of the two smaller groups. This study is indicative of the general lack of control of the variables which may affect the achievement of pupils with respect to the size of the class in which they are taught. The large class was taught by the department chairman with the help of an educational assistant and a paraprofessional worker. The two smaller classes were taught by faculty members. Since both groups did not receive the same treatment, it is difficult to generalize conclusions.

Teachers and students from eleven schools in grades four and five of the Toronto school system were assigned to 34 classes of either 16, 23, 30 or 37 pupils each. Neither class deviated more than two students from these groupings. All students were in grade four the first year and grade five the second year. One stipulation adhered to in the study was that students should not be in a class of the same size for both years of the study. The students were tested on the reading comprehension, vocabulary, math-problem solving and math concepts scales of the Canadian Tests of Basic Skills. There was a significant increase in math concept scores in classes of sixteen but no significant difference in math-problem solving of any of the class size (Wright, 1977).

A three-year longitudinal sample of 517 representative Madison, Wisconsin third grade students was constructed from gathering data on factors such as reading achievement, IQ, sex, age, socio-economic data and average class size. Scores on the Sequential Tests of Educational Progress (STEP) test at the end of the third grade were used as a criterion of final reading achievement. It was found that class size alone was virtually non-predictive of reading achievement. A small class was defined as 20 or less pupils and a large class had more than 20 pupils. The researchers noted that only one pupil enrolled in the small classes all three years (Madison School District, 1976).

In a study by Frymier (1964), it was found that first grade students in small classes of 30 pupils each achieved at a significantly higher level than students in larger classes of 36 pupils each. This and the previous study are clear examples of the inconclusive results that are generated by class size studies.

In a pilot project of first grade students in South Carolina, data were gathered from 25 pairs of first grade classes from 23 South Carolina school districts. Each pair of classes was made up of one experimental and one control class of similar racial and socio-economic status backgrounds but different in size. The experimental classes averaged 19.9 students and the control classes averaged 26.7 students. Meredith (1977) found that, although the reading achievement of first grade students in the smaller classes was significantly greater than in the larger classes, there was no significant difference between large and small classes in math achievement scores. Overall achievement was significantly greater in the small classes.

Moody (1972) conducted an experimental study to determine the effects of class size on the learning of mathematics. Randomly assigned groups of fourth grade students were used to determine the effect of class size upon the learning of ten mathematical objectives. There were 20 groups of one student, 10 groups of two, four groups of five and one group of 23 students for each of three schools in the study. Within each school, seven randomly assigned teachers presented the lesson and tested immediately after the presentation. It was found that students in each of the smaller classes displayed significantly greater attainment of the ten mathematical objectives than those in the classes of 23 students. The author also concluded that one-to-one instruction was significantly superior to a one-to-five ratio. It is interesting to note that Moody's conclusion is diametrically opposed to Laughlin's with respect to the efficacy of a one-to-one teacher-pupil ratio.

It is quite evident, thus far, that the issue of the effects of class size with respect to student academic achievement is yet to be

determined. Not until the Moody study do we get any semblance of a truly controlled experimental study.

Class size studies go back to 1914 when Elliott (1914) randomly selected 40 classes in schools in New York, New Jersey and New England, and compared the students progress in the areas of spelling, handwriting, arithmetic and English composition. The study included 1720 pupils in the fifth and seventh grades. Elliott may have been prophetic when one compares his conclusions with those of Moody's (1972). Although Elliott states that there is a "general lack of a correlation between the size of class in which the children have been taught and such factors as are commonly accepted as adequate measures of school work and progress (p. 80)", he concluded that:

> It may be that the pupil does not reap the advantages... in small classes unless the class becomes so small that the teacher may direct a large share of attention to the study of the individual peculiarities of her pupils and to the employment of special methods in each child's behalf (p. 85).

Cahan and Filby (1979) indirectly respond to Elliott's statement with the use of Gene Glass and Mary Lee Smith's technique of meta-analysis:

> Meta-analysis proceeds by calculating the size of one or more measures of effect in each study, then pools these measures as data points for further analysis. In the case of class size studies, each data point is a measure of the difference in achievement between two classes of different size (p. 492).

They concluded that student achievement increases as class size is reduced and, significantly so, for class sizes of 15 and less. Reductions from 28 to 25 make little difference in achievement. They also noted that class size studies are affected by the design of the research study. Poorly designed studies showed no effect of class size on achievement. This is consistent with Bozzomo's (1978) findings that the major reason

for a lack of consistent evidence about class size, is that, there has not been a research design that has adequately controlled all of the possible confounding variables associated with the students and teachers. Haddad (1979) added that there had not been a qualified definition of "small" or "large" classes. If it is assumed that class size could be measured on a continuum then variations within a distinct interval are not expected to have any significant effects. Haddad further stated that it is what the teacher does with the opportunity of a reduced class size that can make the difference to the learning process. He speculated that class size may or may not make a difference with regards to academic achievement depending upon the method of instruction.

The inconsistent findings among researchers between class size and academic achievement will continue unless strong experimental designs are utilized. Educators need to know if there is a relationship between such factors as method of instruction, age of student, class size and academic achievement. Researchers either need a working definition of "large" and "small" classes or need to identify class size intervals with upper and lower limits.

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